

LISTING OF CLAIMS

1. (Currently Amended) Scanning apparatus operable in the microwave, mm-wave sub mm wave (TeraHerz) and infrared ranges and comprising a support structure, a radiation detector or receiver, a first ~~reflective~~ disc or mirror having a first reflective surface, which is the first disc or mirror mounted in ~~said the~~ support structure for rotation relative to the support structure about a first axis, wherein the first reflective surface has an axis of rotational symmetry tilted at an angle relative to the first axis, a second ~~reflective~~ disc or mirror having a second reflective surface, which is the second disc or mirror mounted in ~~said the~~ support structure for rotation relative to the support structure about a second axis, wherein the second reflective surface has an axis of rotational symmetry tilted at an angle relative to the second axis, a driving means to drive the first and second discs or mirrors in respective opposite senses, wherein the arrangement being first and second discs or mirrors are adapted such that radiation from a scene being scanned can reach a- the first reflective surface of the first disc or mirror to be reflected thereby as a first reflected radiation onto a- the second reflective surface of the second disc or mirror; to be reflected by the latter the second reflective surface, in turn, reflecting the first reflected radiation as a second reflected radiation onto a further part of the apparatus incorporating a the radiation detector or receiver or receivers for such processing the second reflected radiation[,] and wherein said reflective surface of the first disc or mirror has an axis of rotational symmetry, (or a normal where said surface is planar), tilted at a small angle relative to said first axis and wherein said reflective surface of the second disc or mirror has an axis of rotational symmetry (or a normal where said surface is planar) tilted at a small angle relative to said second axis, and driving means for said discs or mirrors arranged to drive these in respective opposite senses.

2. (Currently Amended) Scanning apparatus as claimed in claim 1, wherein said the first and second reflective discs or mirrors are both concave mirrors, arranged with their concave sides facing one another and wherein a wire grid polariser is located between the concave mirrors inclined at an angle with respect to the two concave mirrors, the wire grid polariser being adapted so as to receive radiation, from a scene being scanned, arriving transversely with respect to said first and second axes and to reflect a plane polarised component of such radiation towards said the first concave mirror, and wherein a first quarter wave plate, Faraday rotator or equivalent device is located between said the first concave mirror and said the wire grid polariser, whereby the plane polarised component of the radiation passing to said the first concave mirror and reflected thereby towards said the second concave mirror has its polarisation direction shifted through 90° degrees in passing twice through said the first

quarter wave plate, Faraday rotator or equivalent device, ~~can thus~~ such that it can pass through ~~said the~~ wire grid polariser to ~~said the~~ second concave mirror to be focused in turn by ~~said the~~ second concave mirror onto a the radiation detector or receiver.

3. (Currently Amended) Apparatus according to claim 2, wherein a ~~further~~ second quarter wave plate or Faraday rotator ~~or quarter wave plate~~ or equivalent device is located between ~~said the~~ wire grid polariser and ~~said the~~ second concave mirror, whereby radiation passing through ~~said the~~ second concave mirror and reflected thereby towards ~~said the~~ first concave mirror has its polarisation shifted through 90° ~~degree~~ in passing ~~twice~~ through ~~said the~~ second quarter wave plate, Faraday rotator or equivalent device and is reflected by ~~said the~~ wire grid polariser, in a direction away from the scene being scanned, towards a the radiation detector or receiver.

4. (Currently Amended) Apparatus according to claim 2 wherein ~~said the~~ second concave mirror is ~~arranged~~ adapted to direct ~~said radiation to~~ towards ~~said the~~ radiation detector or receiver indirectly, by directing ~~said the~~ radiation ~~again~~ through ~~said the~~ first quarter wave plate, Faraday rotator or equivalent device to ~~said the~~ first concave mirror, to be reflected again, in turn, by ~~said the~~ first concave mirror.

5. (Currently Amended) Apparatus according to claim 4, wherein ~~arranged so that after the second reflection~~ radiation that is reflected by ~~said the~~ first concave mirror and the subsequently ~~passages~~ passes through the first quarter wave plate, Faraday rotator or equivalent device, ~~the radiation~~ is reflected again by ~~said the~~ wire grid polariser, towards ~~said the~~ radiation detector or receiver.

6. (Currently Amended) Scanning apparatus operable in the microwave, mm-wave, sub mm-wave (TeraHerz) and infrared ranges and comprising a first support structure arranged to position the scanning apparatus with respect to a field of view, and a reflective disc or mirror which is mounted in ~~said the~~ first support structure for rotation relative to the first support structure about a first axis and wherein the reflective surface of the first disc or mirror has an axis of rotational symmetry, ~~(or a normal where said surface is planar)~~, tilted at an angle relative to ~~said the~~ first axis, a second support structure, wherein ~~and in which~~ ~~said the~~ first support structure is ~~itself~~ mounted for rotation with respect to a the second support structure about a second axis that is inclined with respect to ~~said the~~ first axis at the same angle as that at which ~~said the~~ axis of rotational symmetry ~~or normal~~ is tilted relative to ~~said the~~ first axis, the scanning apparatus further including a disc rotating means for rotating ~~said the~~ reflective disc or mirror on or in ~~said the~~ first support structure about ~~said the~~ first axis at a first rate relative to ~~said the~~ second support structure and a support rotating means for rotating ~~said the~~ first support

structure, relative to ~~said the~~ second support structure about ~~said the~~ second axis at the same rotation rate as ~~said the~~ first rate but in the opposite rotational sense from that in which ~~said the~~ reflective disc or mirror is rotated, whereby ~~said the~~ reflective disc or mirror can effect a back and forth linear scan in a the field of view.

7. (Currently Amended) Apparatus according to claim 6 ~~in combination with further having a field scan~~ means for effecting an orthogonal scan at a different rate in a field of view to produce a two-dimensional raster scan of the field of view.

8. (Currently Amended) A scanning apparatus operable in the microwave, mm-wave, sub mm wave (TeraHerz) and infrared ranges and comprising a support structure arranged to position the scanning apparatus with respect to a field of view, a receiver assembly which includes a radiation detector, a primary drum which is mounted in ~~said the~~ support structure for rotation relative to the support structure about a ~~central~~ rotary axis of the primary drum, and adapted to emanate radiation from the field of view, ~~said the~~ primary drum further being hollow and of rectangular polygonal form to provide a number of polygon sides or facets wherein each polygon side or facet is adapted to transmit such radiation which that is plane polarised in a first direction at 45° .degree- with respect to the rotary axis of the primary drum, and wherein each polygon side or facet is adapted to reflect radiation which that is plane polarised in a second direction at 45° .degree- to the rotary axis of the primary drum and perpendicular to the said first polarisation direction, and wherein each polygon side or facet is further configured to act as a concave mirror, to focus the radiation towards the receiver assembly, when reflecting radiation striking that polygon side or facet from within the primary drum; and wherein, such radiation emanating from a field of view of the apparatus, being a field of view which is fixed with respect to said supporting structure, (as opposed to rotating with the primary drum), the arrangement scanning apparatus being is adapted such that radiation from a scene being scanned passing into the primary drum through whichever said any polygon side or facet of the primary drum is currently facing said the field of view and passing towards the a corresponding diametrically opposite polygon side or facet will be plane polarised with a polarization direction such as to be reflected back by said the corresponding diametrically opposite polygon side or facet towards the rotary axis of the primary drum, to be detected by the radiation detector ~~each said polygon side being configured so as to act, when reflecting such radiation striking that side from within the drum, as a concave mirror, to focus the radiation towards a receiver assembly which includes a radiation detector for such radiation.~~

9. (Currently Amended) Apparatus according to claim 8, wherein in which said the radiation detector is stationary with respect to ~~said the~~ support structure, and wherein said the

receiver assembly includes a diametric reflection means whereby the radiation reflected back from such the corresponding diametrically opposite[,]polygon side or facet of the rotating primary drum reaches ~~said~~ the radiation detector as a substantially stationary cone.

10. (Currently Amended) Apparatus according to claim 8, wherein ~~in which said the~~ receiver assembly includes a radiation reflective member mounted within the primary drum for rotation, in ~~said the~~ support structure, about an a member axis that is coincidental with or parallel with ~~said the~~ central rotary axis of the primary drum, the radiation reflective member having a plurality of radiation reflective facets and being such that, in section in a plane perpendicular to the rotary axis, the reflective facets define a regular polygon with twice as many sides as the primary drum, ~~the apparatus including a speed rotation means for rotating said the radiation reflective member at one half the speed of the primary drum, and in the same rotational sense, said radiation reflector having a plurality of radiation reflective facets and being such that, in section in a plane perpendicular to its rotary axis, said reflective facets define a regular polygon with twice as many sides as the primary drum, said and wherein the receiver assembly further including~~ includes a directive means for receiving radiation reflected from ~~said the~~ radiation reflective member, and for directing radiation so-received to ~~said the~~ radiation detector.

11. (Currently Amended) Apparatus according to claim 10, ~~wherein said means for receiving radiation reflected from said radiation reflective member~~ the directive means is located outside the primary drum and wherein ~~said the~~ radiation reflective member is arranged to reflect such radiation, to ~~said means for receiving~~ the directive means, through the sides of the primary drum, ~~means being provided within the drum and interposed between said radiation reflective member and said means for receiving for rotating the polarisation direction of such radiation through 90.degree. to pass through said sides of the primary drum.~~

12. (Currently Amended) Apparatus according to claim 10, wherein ~~said the~~ radiation reflective member comprises a plurality of pairs of reflective facets, one facet of each pair being disposed further along ~~said the member~~ axis of the reflective member than the other, the number of such pairs being twice the number of facets of the primary drum, and wherein the facets of each pair are so arranged that radiation directed onto one of ~~said the reflective~~ facets after reflection from a ~~said side~~ of the primary drum will be reflected onto the other reflective facet of the pair to be reflected thereby through the sides of the primary drum, to ~~said the directive means for receiving radiation.~~

13. (Currently Amended) Apparatus according to claim 12, wherein the two facets of each ~~said pair~~ of reflective facets are perpendicular to one another.

14. (Currently Amended) Apparatus according to claim 13, wherein the two facets of each ~~said~~ pair of reflective facets are inclined at opposite 45° ~~degree~~ angles to the rotary axis of ~~said the~~ radiation reflective member.

15. (Currently Amended) Apparatus according to claim 10, wherein ~~said means for receiving radiation~~ the directive means comprises ~~an element, herein referred to as a~~ transreflector, mounted within the primary drum and arranged not to obstruct plane polarised radiation reflected from a ~~said~~ facet of the primary drum towards ~~said the~~ radiation reflective member but to reflect ~~directly or indirectly to said radiation sensing means,~~ radiation that is reflected onto towards said the transreflector by ~~said the~~ radiation reflective member, to the radiation detector.

16. (New) Apparatus according to claim 11, wherein the receiver assembly further includes a polarizer rotating means provided within the primary drum and disposed between the radiation reflective member and the directive means for rotating the polarisation direction of radiation through 90° to pass through the sides of the primary drum.